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History and Technics of the Subject.*

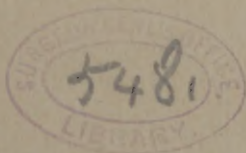
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GASTRIC LAVAGE WITH A CONTINUOUS CURRENT.

AN IMPROVED RECURRENT STOMACH TUBE,
WITH HISTORY AND TECHNICS OF THE SUBJECT.

By JOHN C. HEMMETER, PH. D., M. D., ETC.,
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A BRIEF abstract of the history of the development of the stomach tube was given in an article by the author in this journal (vol. lxi, No. 13) for March 30, 1895, containing an account and illustrations of An Apparatus for Washing out the Stomach and Sigmoid with a Continuous Current with Return Stomach or Rectal Tube. In the present further contribution to the subject the author desires to publish a more complete and practical instrument, the description of which will be supplemented by additional remarks concerning the history of the stomach tube, and a statement of the technique of its more modern applications, indications, and contraindications.

In a recent trip to German and French digestive pathologists it was evinced that a practical return stomach tube would find a wide field of utility.

In many modern works on gastric disorders the original application of the single stomach tube in the treatment

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of certain gastric diseases is so unreservedly conceded to Kussmaul that this investigator is almost universally considered the inventor of the lavage tube and of the stomach pump. Kussmaul undoubtedly is a man of exceptional ingenuity and versatility, and a pioneer in this field of therapeutics, as his best-known first publication on this subject shows (*vide* reference No. 1). A careful study of the literature of the subject will show, however, that stomach tubes were scientifically used long before Kussmaul's publication in 1869.

According to Leube (*vide* reference No. 2) and Ewald (No. 3), gastric lavage was carried out and recommended by Bush in 1822 (*vide* No. 4), Arnott, 1829 (No. 5), Somerville, 1832, Blutin, 1832. In Canstatt's *Text book* (No. 6) the method is recommended as a treatment for gastrectasia. This work was published in 1846. Fabricius ab Aquapendente (7) used an œsophageal bougie or sound to push foreign bodies down into the stomach when they had caught in the œsophagus. The idea of the modern stomach tube, according to Leube (*loc. cit.*), probably had its origin in the *pinna* of the ancient Romans, which was simply a long feather with which the throat was irritated until emesis occurred. "The Roman gourmands knew the bad digestive consequences of their bacchanalian feasts very well, and sought means to avoid the disastrous after-effects of their carousals.¹ As these uncomfortable results do not occur until the ingested food undergoes a certain digestion and transformation, they could be avoided by removal of the stomach contents after all the pleasures of the banquet had been enjoyed. For this purpose emetics were occasionally used, but the *vomitivum*, which was taken at dessert, seems to have been an unpleasant and doubtful means for evacuation of the stomach. Often the dose was too small, an annoying nausea

the consequence. Then, again, too much of the *origanum thymian*, or similar emetics, was drunk, and the vomiting would take no end, although the stomach was empty long ago.

So the efforts were in the direction of some mechanical means of causing emesis more comfortably.

Running the finger down the throat was in most cases sufficient. It soon became customary to use the *pinna* or vomiting feather, for this purpose, however. Emperor Claudius had the custom of allowing his throat to be irritated with the *pinna* until he vomited (cf. *C. Suetonii Tranquilli Opera*, Claudius, cap. 33: "Nec temere unquam trichinio abscessit, nisi distentus ac madeus et ut statim supino ac per somnum hianti pinna in os inderetur ad exonerandum stomachum.") And it was with such a vomiting feather that Claudius was poisoned, according to the order of Agrippina, by his physician, who irritated the emperor's throat with a poisoned feather (Taciti *Annales*, liber xii, cap. 67: "Ille medicus tanquam nisi evomentis adjuvaret, pinnam rapido veneno illitam faucibus ejus demisisse creditur.")

According to Aristophanes (Scholia *ἐιώθασιν οἱ θυσεμοῦντες πτερῶ χρησθαι πρὸς τὸ ἐνχερῶς ἐμέσαι*) and Nicander (*vide* 8), the celebrated Alexandrian physician, a similar method of emesis was practised in Greek antiquity.

Oribasius (9), the celebrated historian of ancient medicine in the fourth century (A. D.), gives an exhaustive account of the methods to produce emesis used in those days. In his descriptions we note the fact that the candidates for emesis were laid on a suspended bed, which was swung and shaken until an artificial seasickness was brought on. He also recommends the use of eight to ten goose feathers dipped in iris oil or cypress oil, in place of the finger, to produce vomiting. His most remarkable statement is a description of a long leather glove-finger, about ten to

twelve inches in length ; the lower two thirds are directed to be stuffed out with woolen fibre, while the upper third is to remain empty to receive the directing finger of the physician. This digital *vomitorium* was lubricated with the oils referred to and introduced into the œsophagus. This instrument Leube (*loc. cit.*) considers the most primitive form of the stomach sound. The writings of Oribasius (*loc. cit.*) contain some very important details on this method. Further historical facts concerning primitive stomach sounds are found in the writings of Avicenna in the eleventh century (10). In his work on poisoning, Hieronymus Mercurialis (11) recommends the use of a *lorum vomitorium* to produce emesis. This instrument, which was specially recommended for opium poisoning by Scribonius Largus (12), is an obscure contrivance, supposed by Leube to have been a leather strap treated with nauseating tannic-acid-containing substances, and producing emesis by its disgusting taste when introduced into the œsophagus.

All of these old contrivances—the *pinna*, the digital *vomitorium* and the *lorum vomitorium*—served but one purpose, the evacuation of the stomach. The next step in the progress toward the modern gastric tube was the extraction of foreign bodies from the œsophagus. The oldest instruments known to have been used for this purpose are short metallic tubes with holes to catch the foreign bodies (fish bones, etc.).

A small lead tube with holes in it was the special device of Joh. Arculanus (12). Ryff (13) used the same thing made of silver, as did also Scultetus (14). The latter writer attributes to Gulielmus Fabric. Hildanus (15) great skill in removing foreign bodies with a tube to the lower end of which a piece of sponge as large as a hazelnut was tied. Fabricius ab Aquapendente went one step further in this matter in advocating the pushing down of foreign bodies

into the stomach when they could not be extracted through the mouth.

Up to this period the use of the œsophageal sound was limited to the causation of emesis and the extraction from the œsophagus of foreign bodies, or pushing them into the stomach. Toward the end of the seventeenth century and the beginning of the eighteenth a new application of this instrument became known—namely, the direct treatment of the gastric mucosa; an indication which has come to the foreground in our time, although in a modified form. It is of interest to us to know that an original method of directly cleansing and treating the gastric mucosa by an improvised sound was in vogue among the natives of South America, and is reported as such by Dapper (16) in 1673. Dapper describes the stomach treatment of these aboriginal tribes in the following words: "The Tapugas, a Brazilian tribe, have a wonderful way of cleansing their belly from the inside. They stick a rope of pladded, sharp leaves down their throat until it reaches the stomach, and there they turn and twist it so long until they vomit and spit blood. Hereafter they draw the rope out and the belly is cleansed."

About the same time that Dapper published his description of the South American method of cleansing the stomach, in the second half of the seventeenth century, an instrument became known in Europe which served a similar purpose, and which, judging from the large amount of literature concerning it, created a sensation. It was variously called stomach cleaner, scratcher, or stomach brush (German, *Magenkrätzer*, *Magenräumer*, *Magenbürste*). The stomach brush was a long, smooth, and very flexible piece of whalebone, varying between two to three feet in length, the lower end forming a small button, to which a tuft or tassel of silk, cord, or linen was tied. This was pushed

down into the œsophagus and the stomach scrubbed with it. Rumsæus (17), speaking of the stomach brush in those days, says: "There was no beer company at which some did not apply it themselves after drinking heavily, either the same night or on the following morning, after having snored out their intoxication through the open mouth, if they were distressed with thick phlegm in the throat." According to Sorbierus (18), a similar brush was used in France in 1694, and Pechlin (19) describes its employment by two Norwegian peasants in the presence of the King of Denmark. And Leube (*loc. cit.*), to whom we are indebted for a compilation of the literature on this subject, gives a very interesting and ridiculous account of the treatment of a Russian statesman by monks with this instrument, which in Germany was at first used only in convents and kept secret there as an "arcanum." But the "arcanum" leaked out, and stomach brushes were manufactured at Leipsic and used everywhere. J. C. Socrates (20) asserted it to be a panacea against all ailments that originated from the stomach, and as a prophylactic means even for healthy persons who desire to prolong their life. "Brushing out the stomach," he says, "with an elixir of aloes, saffron, and myrrh following it, protects the body for twenty four hours from poison and pests; it brings a good memory, improves eyesight, etc., and improves cold and hot fevers, asthma, mammary abscess, consumption, cephalagia, apoplexy, toothache, croup, etc. It seemed," the author remarks, "as if Death had laid aside his scythe and taken a stomach brush in his hand."

The appearance of this stomach brush and its enthusiastic reception by the profession and the laity marks a most interesting epoch in the history of therapeutics. In a period when physicians were almost helpless in treating internal diseases, with an endless confusion in pharmaceutical agents of unknown and unintelligible effects, for the first

time an internal organ is boldly subjected to local mechano-surgical treatment in spite of all orthodox objections. In this rude instrument was represented the germ of the perfected modern method of treating gastric diseases. Leube goes so far (*loc. cit.*) as to intimate that an improved form of the old stomach brush would be worth trying nowadays in nervous dyspepsia and atony of the gastric mucosa. The violent manner in which the brush was used, particularly by the laity, caused its disrepute and it was soon forgotten, and, in the preceding century to this, one finds only œsophageal sounds of whalebone, with sponge ends or ivory knobs at the end, used solely to give relief mechanically in diseases (paralysis) of the œsophagus. These tools were used also to dilate strictures of the œsophagus. Abercrombie (21) employed a silver œsophageal sound with an oval knob at the end for this purpose.

A further field of utility was found when physicians were endeavoring to bring food and medicines into the stomach in cases in which deglutition was impaired, or in cases in which the stomach contents had to be removed more promptly and completely than could be done by emetics. In both instances the object could be accomplished only if the sound took the form of a tube and extended into the stomach.

Fabricius ab Aquapendente (*loc. cit.*, cap. 33) appears to have made one of the first publications concerning artificial alimentation in lockjaw by means of a small silver tube introduced through the nose, also recommending the passage around the posterior molar teeth. An earlier account of artificial alimentation is that of Capivaccus (22), whose instrument consisted of a tube with an animal bladder fixed to the upper end and containing nutritious liquid, which was expressed into the œsophagus (*canula intra gulam immittenda*); the account, however, is not a clear one. When

Van Helmont (1646) discovered a way of manufacturing catheters of leather (23) the œsophageal sounds were made much longer, and in the eighteenth century they were made of an elastic material and used by the illustrious John Hunter (24), who introduced such catheters into the stomach to inject irritating substances into it for resuscitation of the apparently drowned.

The English surgeon, F. Bush, was the first to attach a pump to the stomach tube to evacuate the stomach in a case of opium poisoning (4), though one of the earliest descriptions of a so-called stomach pump is by Samuel Moore, in the *New York Medical and Physical Journal*, vol. vi, No. 3.

The perfect stomach pump, as it is in rare instances used in the present time, must be claimed as an American invention, and Martius and Lüttke (26), and also Kussmaul (*loc. cit.*), give the credit of the same to Dr. Wyman, of Boston, stating at the same time that the instrument was first used for the evacuation of empyematous collections by the elder Dr. Bowditch. The stomach siphon was first proposed by Arnott (5) in 1829, and then by Sommerville in 1832 (quoted from Penzoldt, *vide* No. 27), but passed into oblivion. Kussmaul (*loc. cit.*) again directed attention to it in his publications in 1867 and 1869, and Ewald (3), although not clearly admitting his priority, gives Kussmaul great credit for having again called the attention of the whole medical profession in an impressive way to the use and benefits of the stomach tube. At the *Naturforscherversammlung* at Rostock (1871), Leube opened up an excellent means of using the tube for diagnostic purposes. In 1874 Ewald substituted a soft, flexible tube (gas hose) for the hitherto rigid and hard sound which had up to this time been used only with a whalebone guide or stylet (28). In his text-book Ewald also clears up the nomenclature of the various tubes, which had been called sounds, siphons,

tubes, indiscriminately ; a sound is a solid instrument—only hollow ones must be spoken of as tubes.

In thus briefly reviewing the history of the origin and development of the stomach tube, it can be seen that the primitive object of inserting an instrument into the œsophagus was to produce evacuation of the stomach ; as, for instance, the emesis produced by the *pinna* at Roman feasts.

The second step was to remove foreign bodies from the œsophagus, either by extracting them through the mouth as Scultetus (14), Ryff (13), or Arculanus (12) practised it, or, if this was impossible, to push them down into the stomach, as advocated by Fabricius ab Aquapendente (7).

The third step in the progress of mechanical therapeutics of gastric diseases was the direct treatment of the gastric mucosa with the stomach brush, as described by Rum-sæus (17) and others.

A distinct fourth step in this direction was brought about by the necessity of artificial alimentation in cases of impaired nutrition.

All of these operations had been up to the time of 1646 (Van Helmont) carried out with rigid instruments, the latter being the inventor of the leather catheter. John Hunter (1776) first passed hollow bougies or flexible catheters into the stomach. The practical stomach pump is claimed as an American invention, made by Dr. Wyman, of Boston. Ewald is the sponsor for the very soft, flexible lavage tube as used mostly at present, and proposed it in place of the stiff tubes in 1875.

The tube to which we now turn our attention must be looked upon as a further development in the history of the subject : it is the double or recurrent tube through which the stomach can be washed out with a continuous current. Leube calls it "*Magencatheter à double courant*." This double tube was first devised and employed in gastric dis-

eases by Auerbach (29) in 1870, and Ploss (30) in 1870. In speaking of this tube, Lenbe says: "There is no doubt about it that this tube has definite advantages making it preferable to other single tubes. It permits of a prolonged douche to be carried out on the gastric wall, renders a rapid and complete clearing out of the stomach possible, and excludes entirely the possibility of aspirating the mucosa."

Notwithstanding these advantages, the tubes of Auerbach and Ploss, on account of their great thickness, were found impracticable. They were made of rigid, almost inflexible material, and Ploss states that they are difficult to introduce on account of their large size, for if the diameter of the tube is not very considerable, the stomach contents can not find a sufficient outflow. The authors last referred to express the hope that double stomach tubes may in future perhaps be made of flexible, soft material, with thin walls, insuring considerable volume to the outflow tube without excessively annoying the throat of the patient.

In the *New York Medical Journal* for June 9, 1883, Dr. Henry O. Marcy, of Boston, published a description of double irrigation and drainage tubes, which were also described in the *Transactions of the American Medical Association* for 1881 under the same title. Both of these articles are very short, and treat mainly of the introduction of these double drainage-tubes into the bladder, uterus, rectum, and pleural cavity in empyema; only eight lines are devoted to the treatment of the stomach, stating that "an ordinary rubber syringe is all that is necessary in connection with one of these tubes for speedy emptying of the stomach." In the tubes described in both these articles the outflow and inflow portions are of equal calibre, and as the inflow, carrying water downhill with gravity favoring it, must naturally supply a great deal more water than the same diameter of outflow with gravity opposing, the

inevitable consequence must be that the stomach will be overfilled to bursting. Dr. Marcy, in a private communication to the writer, has stated that he found later that the return current must be larger in order to prevent overfilling.

Evidently, if a rubber syringe is necessary in using the tubes just referred to, they were not so simple in manipulation or as practical as the double tube proposed by the writer in (31) the *New York Medical Journal* for March 30, 1895, which works by itself in simple siphonage.

In this article great stress was laid on the necessity of having the inflow only half the calibre of the outflow, "to insure at all times a greater facility to the outflow than to the inflow, otherwise the stomach may become overloaded with water, which, owing to the elevated position of the reservoir, runs into the stomach very readily and in greater quantities than could be carried away by an outflow tube of the same size as the inflow."

The recurrent tube which the writer proposed (*loc. cit.*) in March, 1895, has by experience since been found to have several objectionable features. In the first place, the central partition, which divided the tube into two channels, produced a lumen with two corners—viz., A and B in the accompanying sketch—and corners are difficult to keep aseptic, besides catching more food particles than a smoothly rounded tube would do. And, secondly, the point of outflow was too near the inflow (both at the end of the tube) to allow of proper sweep to the current, which is very essential for effective cleansing, as the stomach contents must be thoroughly stirred up, and mucus removed that at times seems tightly agglutinated to its walls. Thirdly, the tube was too bulky for most patients. These three objections have, by much patient experimenting, been



FIG. 1.

removed in the improved, very practical, and very graceful instrument which is presented in the following.

The apparatus consists of a glass jar or reservoir, E, which may be of varying capacity, as it probably in most



FIG. 2.

cases of gastrectasia will have to be filled from time to time during the lavage. This is best done by having a tube running up to it from a combination faucet, by which hot and cold water can be mixed to a suitable temperature and constantly supply it above as it runs out into the tube at D. Dr. Herman Straus, assistant to Professor Riegel at Giesen, saw rice particles in the wash water after he had allowed forty litres of water to flow in and out. The writer has personally washed an ectasia without neoplasms for an hour and a quarter with a simple Ewald tube, and after that found thick mucus and bread in the last washing. From this it can be seen how much water is sometimes needed, how much time is consumed, and how necessary a practical time saving recurrent tube has become.

When the treatment is in the sitting position, the glass reservoir should be about twelve inches above his head ; though any convenient shelf will answer, as with increasing pressure, if the outflow is too great, it can be controlled with the stopcock D.

The portions A (inflow) and C (outflow) are made of hard rubber, to which the double tube proper is fastened.

From the exterior this tube B looks like any other soft, single stomach tube ; a cross section, however, would show that it is constructed of one tube within the other.

From A to I, the point where the inflow discharges into the stomach, along the dotted line A I, and firmly molded against one side of the larger tube B, is a smooth tube of smaller calibre which conducts the water from the reservoir into the stomach.

The opening or outlet of the inflow tube is fourteen centimetres distant from the lower end of the tube and the outflow openings, thus compelling the current to circulate through the stomach before it can reach the outflow openings. All gastric tubes must be within the stomach to a distance of fifteen centimetres at least before they siphon properly. This was ascertained by numerous experiments on the cadaver. F, F, and F are the outflow openings at the lower (gastric) end of the tube. G is the beginning of the discharge tube to conduct away the outflow ; it can be led into a bucket or sink or the like. The contour of the smaller inflow tube, which is contained within the larger outflow tube, is perfectly smooth, and presents no uneven edges or corners. The instrument, as turned out by Tiemann & Co., of New York, is provided with the velvet-eye outflow openings of this firm, and probably represents the most perfect double-current stomach tube as yet described. All its contours and lines are perfectly smooth, and in a somewhat

enlarged form it can with great advantage be used as a rectal or colon tube.

In devising a double current stomach tube a great many important physical factors enter into consideration. The quantity of water which flows through the inflow tube in a given time under a given height of the pressure bottle and the quantity of water which will flow out of the outflow tube by simple siphonage must be carefully determined. From twenty measurements of living female patients the author has found that the average distance from the incisor teeth to the deepest portion of the stomach is fifty-five centimetres, and in thirty-six measurements of healthy males the same distance was found to be sixty centimetres. In cadavers this distance is in both sexes, according to the author's experience, shortened by post-mortem rigor, it having been found to be 52.5 centimetres for females in twelve different subjects on the average. In twelve male cadavers the average distance from the incisor teeth to the deepest part of the stomach was fifty four centimetres. In ten cases of dilatation of the stomach the average distance from the incisor teeth to the deepest portion of the stomach, as measured by as rigid a sound as could safely be introduced, was sixty-nine centimetres. In ordering the new double-current tube, however, from Tiemann & Co. the manufacturers were directed to make the portion which is introduced into the body seventy to seventy-two centimetres long, which length, on the basis of the foregoing measurements, was considered sufficient for all requirements. The amount flowing down through the inflow tube will vary with the height of the pressure bottle, but should never exceed more than one litre in two minutes; in the same tube the outflow channel should be able at the same time to discharge by simple siphonage two litres. The inflow and outflow tube should be tested as regards their

calibre, the former by pressure, the latter by siphonage, before they are used on patients.

When the outflow tube is tested as regards the amount of water it will discharge in a given time the tube should be arranged as in Fig. 3, so that the water must rise seventy centimetres, the distance from the deepest portion of the stomach to the incisor teeth, before it can descend into the measuring graduate. The procedure of lavage must be attentively watched in cases where much solid *débris* is expected, and if the outflow becomes choked with solid matter the inflow must be cut off at once until the outward passage is made clear.

A piece of glass tubing two inches long, firmly tied into the outflow tube, is useful, in that it permits the operator to observe the material which is running out.

The single stomach tube has been swallowed entirely and disappeared into the stomach. At least two such accidents are on record, one by Leube (33), the other by Jackson (35); they are both quoted by William H. Welch, in his article on Dilatation of the Stomach in Pepper's *American System of Medicine*, vol. ii.

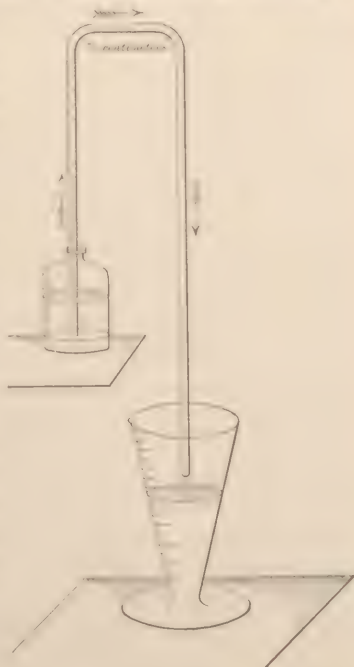


FIG. 3.

With a double or recurrent tube this accident is impossible, as the instrument is tied to the supply reservoir. Aspiration of the mucosa and tearing of pieces of healthy membrane by suction, which has occurred in Leube's experience (2), is also a matter of impossibility with the recurrent tube. Physicians who have used gastric lavage with a simple funnel know how difficult it is to keep air from being sucked into the stomach; a deep funnel of air forms in the centre and is occasionally aspirated into the stomach; all of this is avoided in the recurrent tube. The author, on visiting Professor F. Penzoldt in Erlangen, in July, 1895, was surprised to find this pioneer of digestive pathology still advocating the use of a guide in the shape of a flexible stick or whalebone, which during introduction is inserted into the gastric tube to facilitate its entering the œsophagus after it curves over the base of the tongue.

In his most recent contribution to the subject Penzoldt (*loc. cit.*, 27) gives minute details as regards the method of application of the *Leitungsstab* or *mandrin* within the tube, and says that it should be oiled to facilitate its removal when the tube has reached the middle of the œsophagus. He also suggests catching the tip of the lavage tube between the index and middle fingers of the left hand, which are inserted into the patient's mouth, and bending the tip down over the base of the tongue until it enters the œsophagus. This is the method advocated by his teacher, Professor Leube (*loc. cit.*, 2), and also by Rosenheim (36). In the writer's experience the intratubal whalebone guide and the insertion of the fingers into the patient's mouth are superfluous. The tube can always be introduced without a guide and without touching the patient. The main point is that the point of the tube, when it has reached the wall of the pharynx, shall be deflected downward. This will occur without exception and in a very natural, easy manner if the

patient is directed to swallow at this moment. In the moment of this act of deglutition the point of the tube is bent downward into the œsophagus. Beginners in using the tube need have no fear that it will enter the trachea. To make it enter the trachea is, in the writer's experience, a difficult undertaking, and requires special training and dexterity. He was present on an occasion when a class of ten students were taking a private course in diseases of the throat, during which lesson they were trying to mop the larynx. What they really did was to mop out the superior portion of the œsophagus. Direct the patient to keep taking deep inspirations, and as soon as the tip or point of the tube is felt touching the pharyngeal wall, tell him to swallow, and almost immediately the tube follows into the œsophagus and can be pushed into the stomach without further resistance. It is not necessary for the patient to open his teeth any wider than just to admit the sound; at the same time caution him not to bite on it, but keep breathing naturally. No patient should be subjected to gastric lavage without previously examining the thorax. Penzoldt tells of a case in which the stomach should have been washed out in the morning, but on account of lack of time this was postponed until the same evening. On the same afternoon the patient died of rupture of an aortic aneurysm into the œsophagus. This leads to the conclusion of this paper with a brief statement of the indications and contraindications of gastric lavage.

The recurrent stomach tube is not available in the removal of test meals from the stomach, because it needs too much water to operate satisfactorily, which would later complicate the analysis. If, however, this surplus water is no objection to the chemist, the double tube is a rapid means of obtaining gastric contents. The same indications and contraindications that hold good in applying the single

tube appertain also to the double tube. They are these: the tube is contraindicated—

1. In all constitutional and local diseases in which the diseases could be aggravated or life endangered by the irritation and exertion of lavage. Among these could be mentioned :

1. Pregnancy (though this is not a disease).

2. Heart diseases in a state of defective compensation—heart neuroses, angina pectoris, myocarditis, and fatty heart in advanced stage.

3. Aneurysm of the large arteries.

4. Recent hæmorrhages of all kinds, including apoplexies, pulmonary, renal, vesical, gastric, and rectal hæmorrhage and hæmorrhagic infarctions.

5. Advanced pulmonary tuberculosis.

6. Advanced pulmonary emphysema with bronchitis.

7. Apoplexia and cerebral hyperæmia.

8. Advanced cachexia.

9. Presence of continued or remittent fever.

The stomach and intestinal diseases which Boas states are contraindications of the use of the tube are :

1. Uleer with recent hæmatemesis and dark stools.

2. Palpable carcinoma of the pylorus, with vomiting of coffee-ground material and the classical symptoms of cancer.

3. Many gastric neuroses in which the character of the malady is clear without lavage.

4. Stomach or intestinal troubles with acute fever.

5. Gastric mucosa easily started to bleeding.

6. Secondary gastric affections whose dependence upon a distinct and more important primary disease is evident.

These are not invariable rules, however; there may occur cases under some of these exceptions at times that on account of depressing self-intoxication from the stomach or

advanced gastric fermentation peremptorily require lavage. Thus, according to Boas, it has been employed with success in pregnancy, and the author has once washed out the stomach in a case of typhoid fever with favorable result, and also performed lavage in a case of aortic regurgitation with Bright's disease and gastrectasia where much relief was experienced from the procedure. Professor Moritz, of Munich, has frequently passed the stomach tube in pregnant women to ascertain the intragastric pressure (25). Although gastric pathology is emerging more and more from empiricism, and approaching an exact science based upon chemical, physiological, and pathological facts, still much depends upon the experience and judgment of the physician, and here as well as in many instances that put to the test our experience in medicine, the quotation with which Ewald closes his book (*loc. cit.*) is true.

*Ubi ratio sine experimentis mendax
Ita experientia sine ratione fallax.*

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